TABLE 7.

Date, 1903.	Location of storm center, 8 a. m.	Increase in pressure, in tenths of inches, measured outwardly from the storm center toward: N.	NE.	E.	SE.	S.	SW.	W.	NW.	Actual movement of storm center in succeeding 24 hours.	Predicted movement of storm center in succeeding 24 hours.	Angular divergence between actual and predicted paths.
										cm.†	*cm.*†	°
January 1	West Gulf	2	4	2	0	0	0	0	0	7.5	6.5	15.0
2	Southeast Arkansas	3	5	4	3	2	3	3	5	14.0	12.0	13.0
3	Lake Erie	4	6	6	5	5	6	6	5	15.5	14.0	4.0
3	Near Medicine Hat	*	*	*	*	*	*	*	*	13.0	13.0	10.0
4	Iowa	2	2	1	0	0	1	5	2	10.5	14.0	17.0
5	Southern Indiana	0	0	1	2	0	0	4	1	12.5	14.5	7.0
5	Alberta	*	*	*	*	*	*	*	*	10.5	13.0	4.0
6	Manitoba	*	*	*	*	*	*	*	*	13.5	13.5	10.0
7	Lower Michigan	10	10	6	9	11	12	12	12	17.5	21.0	5.0
9	Arizona	4	5	0	0	0	0	1	3	11.5	13.0	0.0
10	Rio Grande Valley	0	5	4	2	0	0	0	4	17.0	11.0	19.0
11	Ohio Valley	2	2	7	5	4	6	7	6	23.0	23.5	3.0
20	Lake Superior	6	6	7	9	3	4	6	6	12.5	10.0	0.0
20	Central Texas	3	2	1	1	1	1	2	4	8.5	10.0	13.0
21	New Jersey	3	6	5	5	2	3	5	6	16.0	13.5	9.0
21	North Dakota	*	*	*	*	*	*	*	*	12.0	12.5	9.0
22	Upper Michigan	*	*	*	*	*	*	*	*	14.0	12.5	7.0
23	Oklahoma	5	6	5	4	3	3	4	4	10.5	10.0	8.0
24	Kentucky	3	6	4	2	1	2	1	1	5.0	5.0	9.0
26	Northwest Texas	4	1	7	3	2	2	2	4	8.0	8.0	7.0
28	Wyoming	4	5	4	5	4	5	5	3	14.5	13.5	7.0
29	Lake Michigan	*	*	*	*	*	*	*	*	9.5	12.5	4.0
Average										12.5‡	12.5‡	7.95

* Normal storm track used as predicted path; impossible to get correct pressure resultant. † Expressed in centimeters as measured on the 8 a. m. maps, where 1 centimeter = $\frac{1}{75}$ degree of a great circle, or about 62.2 English statute miles on the earth's surface, and where 0.438 inch is a degree of the great circle, or about 69.09 miles. ‡ 777.4 miles.

cally shown on Chart XXVIII. The table shows the increase in barometric pressure outward in every direction from the storm center; from the data in these eight columns the pressure resultants were determined, and thence the paths predicted by the present method. This information may be useful to any reader who cares to check the results shown by the charts.

CLIMATOLOGY OF HAITI IN THE EIGHTEENTH CENTURY.

By C. FITZHUGH TALMAN, U. S. Weather Bureau.

Foremost among the early writers upon the island of Santo Domingo, was Médéric-Louis-Elie Moreau de St. Méry, who produced three voluminous works upon the French possessions in the West Indies. Born at Fort Royal, Martinique, in 1750, he passed his early manhood in Paris, migrated thence to Haiti, and settled at the then capital of the colony, Cap Français (now Cap Haïtien). He held an important office in the administration of the colony, and also, under a commission from Louis XVI, traveled extensively through the French West Indies, collecting material for a work which was published in 1785 under the title, "Lois et Constitutions des Colonies Françaises de l'Amérique sous le Vent, de 1550 à 1785." Returning to France, he took an active part in the French Revolution, until obliged to flee from his political enemies to the United States. It was during a period of exile in the latter country that he published two works descriptive of the island of Santo Domingo; one devoted to the Spanish part of the island, and the other to the French part.

Having recently obtained access to the latter of these works,[1] I have, at the suggestion of the Editor of the MONTHLY WEATHER REVIEW, extracted and translated those portions relating to the climate—a subject to which the author devotes a generous share of attention. The original material is scattered through the two volumes of which the work is composed; and it is frequently so diffuse in style and so overloaded with trivial details that a certain amount of condensation was imperative; but I have not intentionally omitted anything of strictly meteorological interest and importance.

Haiti enjoys the rare distinction of having been more thoroughly studied climatologically in the eighteenth century then in the nineteenth. As a French colony Haiti reached a high state of civilization, and among its prosperous inhabitants were many assiduous cultivators of the sciences. A scientific society, the Cercle des Philadelphes, flourished in colonial days, and it is understood that a volume (Tome II) of the memoirs of this society was devoted to meteorology, but, in spite of diligent inquiry, I have not been able to obtain or locate a copy of this work. Possibly it was the source from which Moreau de St. Méry drew most of his information upon the climate of the colony.

Whereas under French rule meteorological observers were well distributed over the country and interesting local peculiarities of the climate were brought to light, since the war of independence meteorology has been almost entirely neglected except at Port au Prince. At the latter place regular observations were maintained by Ackermann from 1863 to 1868, inclusive; since 1888 they have been made by Scherer, of the Collège St. Martial. Scherer's observations are published in detail in the Jahrbücher of the Vienna Central-Anstalt; and both Ackermann's and Scherer's observations were fully discussed in the "Anhang" to the Jahrbuch for 1893, and in the Meteorologische Zeitschrift for March, 1897, pp. 116–119. Outside of Port au Prince and its environs no observations are known to have been made in Haiti during the nineteenth century, with the exception of brief series at Cap Haïtien and Sans Souci,[2] about 1819, and rainfall observations at one or two of the stations recently organized by Professor Scherer.

Finally, in 1905, the Société Astronomique et Météorologique de Port au Prince was organized, having, as one of its objects, the inauguration of climatological observations throughout the country. The monthly leaflets published by this society, as well as those published by Professor Scherer, now include results from a few stations outside of the capital.

In the following translation will be found particulars regarding the climate of most of the parishes into which the French colony was divided. Although the boundary lines of the parishes are not given on the accompanying map, fig. 1, the location of each parish is indicated in a general way by that of its chief town, which usually bears the same name. In the case of the Artibonite plain and river the author has found it convenient to treat several contiguous parishes together, as they have similar physical features.

[1] Moreau de St. Méry, M. L. E. Description topographique, physique, civil, politique et historique de la partie française de l'Ile Saint-Domingue. Philadelphie. 1797. 2 vols. This work was republished in 1875 (Paris. Morgand. 2 vols., 8°), but I have seen only the original edition. It is to this day regarded by the Haitians as the highest authority upon the physical geography of their country, and is quoted at length in the latest Haitian gazetteer (Rouzier, S. Dictionnaire géographique et administratif d'Haïti. Paris. 1899).

[2] Tippenhauer, L. G. Die Insel Haiti. Leipzig. 1893.

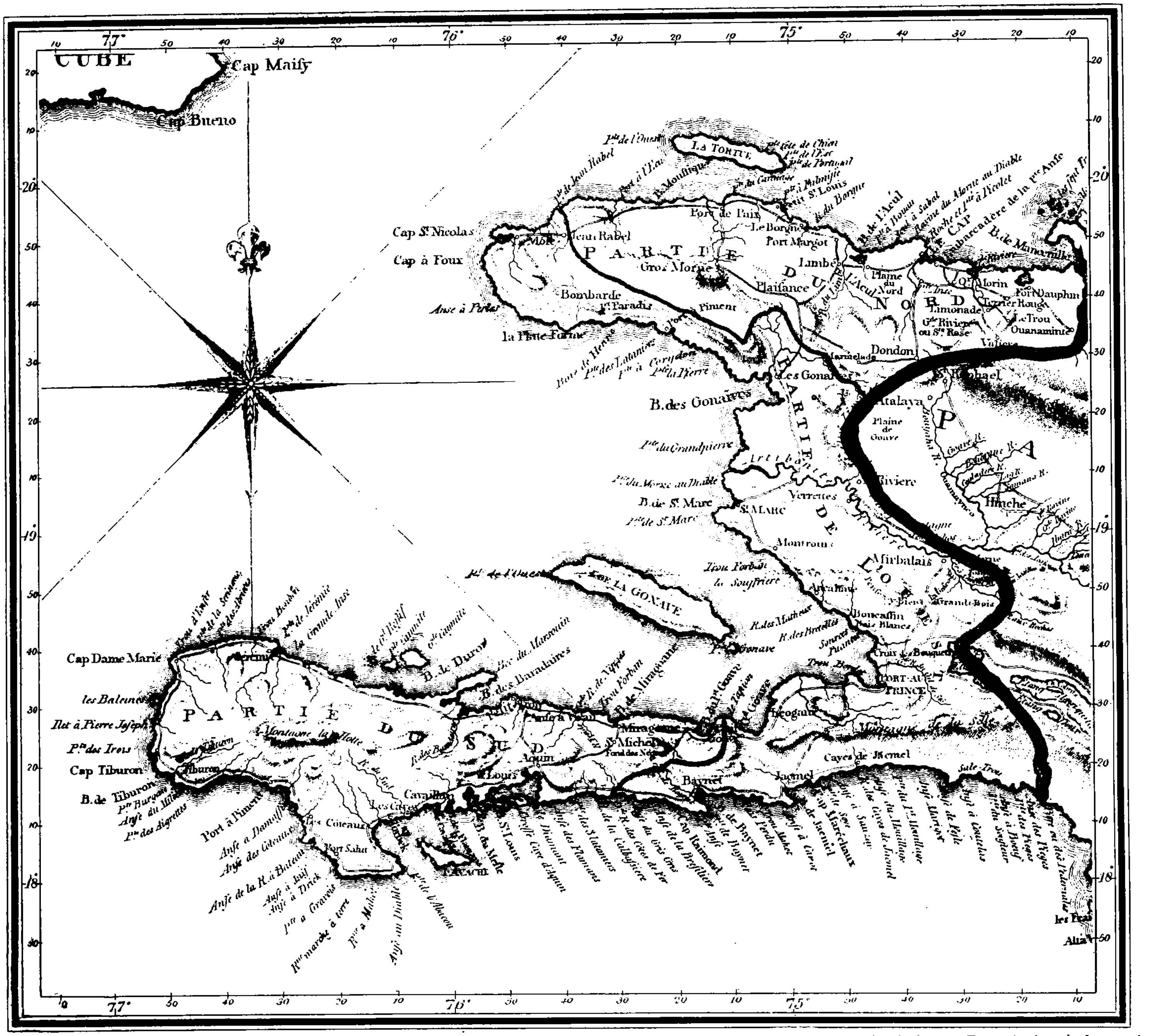

FIG. 1.—Chart of the French part of the island of Santo Domingo in the eighteenth century. (From Moreau de St. Méry: "Description de la partie française de l'Ile St. Domingue.")

In St. Méry's work the temperatures are invariably expressed in Réaumur degrees, and rainfall measurements and barometer readings in French inches and lines. For these the translator has supplied, in brackets, the centigrade and metric equivalents, respectively, in order that the observations may be readily comparable with those of modern observers.

NORTHERN PART.

Parish of Fort Dauphin.—The climate is extreme. After an annual drought, which ordinarily lasts from February to May or June, the rains become excessive with the first thunderstorms.

Parish of Ouanaminthe.—The climate of this parish is similar to that of the parish of Fort Dauphin, but with this peculiarity, that, especially in the canton of Ouanaminthe proper, the droughts are much more severe and the rains which follow them cause much greater floods. Violent thunderstorms occur; in fact the thunderstorms which move toward the northern part of the colony take their rise in the chain of Cibao and the mountains near Maribarou, and it has passed into a proverb to say, when a distant thunderstorm is heard, "Maribarou is growling" (*"Maribarou gronde"*). Lightning strikes here quite frequently, and has caused many fires. On June 17, 1783, at 2:20 p. m., after a furious wind and rainstorm, a fall of hail occurred, some of the hailstones being as big as one's fist. It lasted about twenty-eight minutes and was followed by a shower. Fortunately the rain which preceded the hailstorm had caused the negroes and animals to get under shelter, otherwise they would have been injured or even killed by the enormous hailstones.

On October 2, 1764, lightning struck in the town of Ouanaminthe, where it killed M. Belleville, an attorney of Fort Dauphin, M. Chaillou, an ex-notary, and a carpenter. Ten other persons who were in the room were knocked over by the shock without receiving any injury; but two Spanish soldiers,

of the guard post on the other side of the Massacre [River], were killed.

Parish of Vallière.—The situation of this parish, surrounded by mountains, protects it from the droughts which devastate the open plains in its vicinity. On the other hand it is subject to excessive rainfall and floods. In the hurricane of August 4–5, 1772, which was felt from Ouanaminthe to St. Marc, the wind, which blew from the southeast, threw down buildings and destroyed the manioc, rice, and peas. The Acul de Samedi, the Acul des Pins, and Nouvelle-Bretagne were ravaged; the coffee crop, which was on the bushes, was nearly half destroyed, and what remained in the storehouses of the crop of the preceding season was considerably damaged. An abundant rain, lasting 24 hours, added floods to the list of calamities.

The climate of Vallière is quite cool, and would even be found cold by the inhabitants of the cities. The fruit trees of France could be naturalized here.

Parish of Terrier Rouge.—The climate of Terrier Rouge is generally dry. This parish suffered extremely from the drought which prevailed here from the end of August, 1785, to April, 1786, and which is believed to have caused spontaneous fires in several cane fields.

Parish of Le Trou.—The climate of the plain of Le Trou is made known through the observations of Mr. Warlock in 1783, 1784, 1785, and 1786 on the Craon estate, situated about halfway between the eastern and western extremities of the plain and at the foot of the mountains. It should be observed that, like the Dubuisson estate adjoining, this place receives rain squalls in which the rest of the plain does not share. To make the observations apply to the plain generally one should deduct a few inches from the rainfall.

The following are the results of these observations:

Year.	Number of rainy days.	Total rainfall.		Equivalent in millimeters.
		*Inches.	Lines.	
1783	76	49	5	[1338]
1784	109	73	2	[1981]
1785	81	40	1	[1085]
1786	85	55	7	[1505]

*French inch=1.065765 English inches.

The rainy months are June, July, August, September, October, and November, for which the results were:

Year.	Number of rainy days.	Total rainfall in inches.	Equivalent in millimeters.
1783	38	23	[623]
1784	71	46	[1245]
1785	51	19	[514]
1786	61	38	[1029]

The observer remarks that of these four years the most favorable for agriculture was 1785, because it was preceded by a very rainy year and one in which the rainfall was evenly distributed. For the opposite reason the year 1786 was a year of drought, in which wells, pools, brooks, and even rivers were dried up, although it had more rain than 1783 or 1785. But drought had prevailed from November, 1785, to July, 1786; so that the evaporation was excessive during the first rains that succeeded this long interval.

The greatest height of the barometer during these four years was 28 inches 4 lines [766.98 mm.], and its least height 27 inches 6 lines [744.42 mm.].

The Réaumur thermometer indicated a maximum temperature of 32° [40° C.], and a minimum of 15° [19° C.].

The prevailing winds are east-northeast by day, and west-southwest at night. The rarest are those from northwest and southeast.

On May 5, 1786, intolerable heat prevailed at Le Trou. The Réaumur thermometer, placed in the shade and having a north exposure, stood at 19° [24° C.] before sunrise, and rose to 31½° [39° C.] at 2 o'clock. The wind was southerly and variable. More than two hundred wardrobes (*armoires*) and tables of mahogany were burst and split from top to bottom.

The climate of the mountains is much cooler than that of the plain, and droughts are much less felt, especially in the east. The canton of Écrevisses, for example, about three leagues in circumference, has a soil somewhat superior to that of Moka, which it adjoins. It formerly received from 90 to 100 inches [24 6 to 2707 mm.] of rain per annum, and the hurricane and rains of August 4–5, 1772, which devastated it, augmented this proportion, but since 1773 it has been subject to drought like the rest of the parish. The year 1777 was exceptional, and nearly the above amount fell. The drought of 1776 induced M. Chevalier, an inhabitant of the mountain of Écrevisses, to plant cotton, which succeeded perfectly. Encouraged by this attempt, he planted an immense quantity in 1777, and it was entirely destroyed by the rains. In the summer of 1781 the canton of Écrevisses was favorably treated. The "norths" generally furnish a third part of the rainfall of the year.

["Norths" are persistent north winds, characterizing certain seasons. Sometimes the term is applied to what we now call northers. Cf. Dampier's "Voyages" and the accounts given by other early navigators of the meteorology of the Caribbean.]

Parish of Limonade.—The Réaumur thermometer, during 25 years of observations in the plain of Limonade, in the vicinity of the sea, did not rise above 28° [35° C.], and did not fall below 18° [22½° C.]. The temperature in the mountains varies according to elevation and locality. In winter it ranges commonly from 9° [11° C.] at dawn to 16° [20° C.] in the greatest heat of the day, and in summer from 18° to 22° [22° to 28° C.], except that days totally without breeze may carry it up to 27° [34° C.], a very rare occurrence.

The amount of rain falling annually in the plain may be estimated at from 80 to 90 inches [2166 to 2436 mm.]. Sometimes, during the season called in the Windward Isles "hivernage," i. e., the period from July to October, little wind squalls occur, which unroof and overturn the negro cabins and even the cane barns *(cases à bagasses)*, damage tile and slate roofs, and destroy the banana plants.

These wind squalls are accompanied by excessive rain, causing disastrous floods. The destruction wrought by these floods, however, is not to be compared to that due to droughts, which for twenty years have been continually growing more frequent.

Parish of Sainte Rose.—The climate is mild at Sainte Rose, and even on the summit of la Montagne Noire (Black Mountain) a temperature of 9° R. above freezing [11° C.] has been observed during the night. The finest vegetables, superb flowers, and large artichokes grow on this mountain, where more than one inhabitant of the Cape [i. e., the town of Cape Haïtien] or the plains has recovered his health in an atmosphere which seems sharp and cold by contrast with the heat of the Tropics.

Formerly the annual rainfall at Sainte Rose was estimated at 90 inches [2436 mm.]. But Santo Domingo is continually growing dryer, and for some years past hardly two-thirds of this amount has been observed. The rains are brought by the norths and by thunderstorms, but the latter are the most potent cause, for the six rainy months are generally considered to be June–November, which give seven-tenths of the rainy days and five-eighths of the annual rainfall.

Parish of St. Louis du Morin.—This parish has a comparatively hot climate, and it is in the middle rank with regard to rainfall. The lower part of the plain may receive annually 50 inches [1354 mm.] of rain, and this quantity is somewhat

exceeded in the vicinity of the "mornes" [isolated hills or mountains], where, moreover, the moisture is conserved for a longer time. The rainy months are May-December, and the driest month is April. The heat is extreme in the long days, and in the absence of a breeze. A Réaumur spirit thermometer at the town of Petite-Anse, at noon September 7, 1775, stood at 24° [30° C.] in the shade, and rose to 49° [61° C.] in the sun. In October, 1779, a similar thermometer, exposed in a well-ventilated room, in the same town, rose to 34° [42½° C.] at 4 p. m.

Parish of Dondon.—The greatest range of temperature observed in ordinary years is 20° R. [25° C.]; for the temperature fluctuates between 5° R. [6° C.] and 25° R. [31° C.] in exposed valleys. In the summer the thermometer ranges from 12° to 24° R. [15° to 30° C.]; in winter from 7° to 15° R. [9° to 19° C.]. In the middle elevations of the mountains the range is 10° to 22° R. [12½° to 27½° C.] in the summer, and 4° or 5° to 12° R. [5° to 15° C.] in winter.

Dondon is exposed to southwest squalls, which are the precursors of violent thunderstorms, and which, though of brief duration, are very destructive. Sometimes this wind lasts for a considerable time, as during the disastrous hurricane of August 4–5, 1772.

Parish of Marmelade.—This parish was so named by the inhabitants of surrounding districts because the excessive rains make of its soil a kind of mush or *marmelade.*

A greater variety of climate prevails in this parish than in the other parishes. In the canton of Marmelade proper, the temperature corresponds to that of the inland provinces of France at the end of a beautiful month of May. In the six months from October to April the Réaumur thermometer descends to 9° [11° C.] at sunrise, and rises only to 16° [20° C.] toward midday. In the other six months it rises to 24° [30° C.] by day and falls to 20° [25° C.] at night. It rarely reaches 27° [34° C.], even during the hottest years. The nights are cool, and one can seldom dispense with a cotton quilt. The rainfall is abundant, and may be estimated at as much as 100 inches [2707 mm.]. Thunderstorms are frequent and destructive. They occur, however, only in summer, are frequently nocturnal, and are of brief duration; hence they do not prevent the enjoyment of blue skies, which continue even during the prevalence of the norths.

In the canton of La Soufrière rain and fog are frequent. The weather in this canton is often cold enough, even in August, to make a fire agreeable.

In the canton of Ennery it rains much less than at Marmelade, and scorching heat is felt, which is attributed to the proximity of the Spanish savannas. The heat seems to increase with the clearing of the land.

Parish of Petite-Anse.—The climate of this parish may be studied from the trustworthy observations of M. Odeluc, made on the Galifet plantation, near the church, during the last four months of 1784 and the years 1785 and 1786.

Instruments: Spirit thermometer, exposed in the shade, in a room nearly always open, windows closed only by Venetian blinds, and facing the north. Rain gage a tin vessel, one cubic foot in volume, graduated, mounted on a pedestal, and isolated. Evaporation measured in a tin vessel eight inches square in horizontal section by five inches deep, graduated and set in a wooden box filled with earth.

Last four months of 1784.

Highest temperature in shade: (September 11, midday) 27° R. [34° C.].
Lowest temperature: (December 23, before sunrise) 14° R. [17½° C.].[3]
Difference: 13° R. [16° C.].
Rainfall: 13 inches, 11 lines [377 mm.].
Evaporation: 25 inches, 5 lines [688 mm.].
Rainy days: September, 10; October, 6; November, 10; December, 6.
Prevailing winds: east, north, and southwest.

[3] On December 31, at 6 a. m., the temperature out of doors fell to 11½° R. [14° C.].

1785.

Highest temperature	25½° R. [32° C.].
Lowest temperature	14° R. [17½° C.].
Difference	11½° R. [14° C.].
Rainfall	75 inches, ¼ line [2031 mm.].
Evaporation	70 inches, 5 lines [1906 mm.].

1786.

Only 29 inches 2 lines [790 mm.] of rain, half of which fell in October and December. Extreme dryness characterized the first four months of the year. During February, March, and April southwest winds so hot as to cause the splitting of furniture and the breaking of earthenware vessels.

Parish of Cap Français. [Generally referred to as "*le Cap,*" "the Cape." The modern Cap Haïtien.] The town is shut in by mountains on its north and west sides, and in part on its south side. It is fully exposed to the morning sun, while the sea breeze is turned aside by the mountains back of the town and hardly tempers the heat. A hot climate is the result. A Réaumur spirit thermometer, shaded and exposed to the north, gives annual extreme readings of 16° [20° C.] and 28° [35° C.].

January is commonly very rainy and is likely to have winds from northeast to northwest. The mountains appear hazy in the distance. The temperature is 16°–18° R. [20°–22½° C.] in the morning; 20°–21° R. [25°–26° C.] at noon.

February is very similar to January, but is marked by greater cloudiness, while the rains are less continuous.

March resembles February, but the north wind is sometimes replaced by a west wind, raising the temperature; the thermometer reads one or two degrees higher than in January.

April is very variable from year to year; sometimes it prolongs the period of the norths and rains, but more often it is dry; violent northeast winds spring up, "brises carabinées"[4] are frequent, and thunderstorms occur. The temperature continues to rise.

In the first part of May the strong breezes of April still prevail; they are succeeded by southerly winds in the latter part, with a stifling atmosphere and frequent thunderstorms. There have been years (e. g., 1775) when for six successive weeks a daily thunderstorm has burst upon the Cape at nearly the same hour (between 5 and 6 in the evening). Sometimes it lasts only an hour or two, at other times it continues far into the night.

June begins like the latter half of May; in both months the temperature reaches 24° or 25° R. [30° or 31° C.]. The thunderstorms are shorter and less regular and cloudy skies are more frequent. Violent northeast winds reappear at the end of the month, and the thermometer shows alternations of heat and cold.

During July thunderstorms still occur from time to time, and also rains; but the heat is greatly increased and reaches 25° and 26° R. [31°–32½° C.] at midday. The winds are variable and pass from northwest to southeast; they hardly seem to cool the air.

August is dry; rain only occurs with a thunderstorm; the temperature is the same as in July.

It is in September that the climate is most trying and that the temperature reaches its highest point. The winds are irregular, and even lacking for days together. The thermometer reaches 28° R. [35° C.] and even higher at times. If occasionally a little rain occurs the air is merely made closer by it.

October is looked forward to with impatience; unless the norths are delayed it comes as a relief after six months in which the heat[5] has been an incessant cause of complaint. If the norths make their appearance the temperature no longer rises above 23° or 24° R. [29°–30° C.]; if they are delayed it reaches 25° R. [31° C.].

[4] *Brise carabinée.* Brise soudaine et violente comme un coup de carabine.—Larousse.

[5] "Celle-ci faisait dire à quelqu'un, avec assez de verité, qu'à Saint-Domingue on passait la moitié de son temps à suer et l'autre à s'essuyer."

In November the thermometer falls to 18° R. [22½° C.], but also rises to 24° R. [30° C.] unless the norths are very pronounced.

December also belongs to the season of norths, but is sometimes absolutely dry. The thermometer falls to 16° [20° C.]. Not infrequently, however, thunderstorms occur, adding their heavy rains to the fine and penetrating rains which accompany the north winds.

During the hot months the nights are generally as hot as the afternoons, and are very oppressive.

Thunderstorms are generally very severe at the Cape, and lightning frequently strikes here.

Toward the end of 1772 there were several months of rain and great floods. In 1732 the rains were so continuous that public prayers for their cessation were offered during October. Destructive rains also occurred in May, 1735, during several months of 1752, and in April, 1766. During the last four months of 1787 it rained every day.

On the other hand, a severe drought prevailed during eleven months of 1726. April, 1743, terminated a drought of six months' duration. Droughts and famine occurred in 1753 and 1754. In 1757 there were more than four months of drought. The same scourge reappeared at the beginning of 1764 and 1769, and it has been very frequent since. It prevailed at the beginning of 1774; from January to August, 1776; at the end of 1778 and the beginning of 1779; from the end of 1780 to May, 1781; from the end of 1785 to September, 1786. Cruel famines accompanied the droughts of 1774 and 1778. No other drought, however, equalled that of 1786, which in some places lasted a year. Excessively high temperatures prevailed, and all the wells were dried up.

The winds, also, display their fury at the Cape. August 14, 1680, is famous for a terrible hurricane. In the night of November 13–14, 1765, there was a frightful hurricane, which greatly damaged the houses of the town, while all the vessels in the roadstead suffered, many small craft being sunk. A north on October 15, 1780, unroofed several houses. On September 27, 1785, a moderate hurricane was experienced.

Parish of Limbé.—Of all the parishes in the northern part of the island, that of Limbé receives the most rain. The rainfall from the first of April, 1783, to the end of March, 1784 [one year], has been calculated at 17 feet 7 inches 8 lines [5730 mm.]. These rains, though sometimes harmful on account of overabundance, insure the inhabitants against the occurrence of the droughts which so frequently devastate the other parts of the island. Droughts are not entirely unknown, however. The drought of 1786 was severely felt here.

Parish of Plaisance.—The rivers of Plaisance are never dried up, the rains being too abundant to permit this. The annual rainfall is estimated at 80 inches [2166 mm.], but the amount is decreasing.

Partly to the abundant rains, and partly to the conformation of the flat portions of the parish, is attributed the phenomenon of a fog of almost daily occurrence. It forms sometimes before sunrise, sometimes later; and varies greatly in density. Its base is most often on the ground, but sometimes there is a well-marked interval beneath it. The colonists consider this phenomenon a trustworthy indicator of the weather; if the fog is gradually dissipated, it promises a fine afternoon; if it rises, rain is near at hand. In the rainy season the fog does not often occur in the valleys, but seeks the high places; it disappears between 8 and 9 o'clock in the morning.

Plaisance is for the most part mountainous, and even its valleys are at a considerable elevation above sea level; hence a cool climate. The maximum temperature in the valleys is 25½ R. [32° C.], and at the summit of the mountains it does not rise above 22° R. [27½° C.]. In general, the temperature is cooler than that of the neighboring parishes by as much as 3° or 4° R. This difference in temperature may be taken as one of the causes of the condensation of moisture over this well-watered region, especially as the fog is absent when the wind blows during the night.

It is not very rare to see the temperature fall in a few hours as much as 7° or 8° in the higher parts of the mountain chains which border this parish. The cold then seems greater by contrast, though the thermometer still indicates 14° or 15° R. [17½–19° C.].

Parish of Port Margot.—According to the observations of M. Le Gras, made on his wife's plantation, there were at Port Margot:

In 1781, 93 rainy days. In 1782, 112 rainy days. In 1783, 146 rainy days, yielding 158 inches, 10 lines [4300 mm.] of rain. The rivers were in flood from the 1st to the 21st of November, doing incredible damage. In 1784, 160 rainy days, and 123 inches [3330 mm.] of rain. The month of March, which generally is not rainy, yielded 20 inches 6 lines [555 mm.] of rain in 15 days.

The foregoing observations were made near the center of the plain; on the coast the rainfall is about one-fifth less, near the mountains about two-fifths more. In spite of the considerable rainfall fog is rare.

Parish of Le Borgne.—According to observations made by M. Odelucq, on his plantation, in the canton of Vallée de Josaphat, or Joseph, in the southwest, the highest temperature during 1785 was 22° R. [27½° C.], and the lowest 12° R. [15° C.]. One hundred and forty-six days with rain gave 340 inches, 1 line [9206 mm.] of rainfall.[6] According to observations made by Father Balthazar, curé, during the first six months of 1788, the highest temperature was 22° R. [27½° C.] at midday, and the lowest 15° R. [19° C.] at 6 a. m. The rainfall was 71 inches, 1½ lines [1925 mm.].

Parish of Gros-Morne.—The air of Gros-Morne is very healthy. The regular east and east-northeast breezes contribute greatly, no doubt, to its salubrity. At the same time the climate is very dry, and sometimes no rain falls for six months, whence results great damage to crops and live stock,

Parish of Petit St. Louis, or St. Louis du Nord.—The air is generally healthy, though the climate is so rainy that a month without rain is regarded as a drought. The temperature is similar to that of Port de Paix.

A coffee mill on the estate of M. Dubuisson was struck by lightning, which did some damage to the woodwork. The following day M. Dubuisson, in showing to a visitor the effects of the lightning, touched one of the pieces of wood and received a violent shock, which caused his arm to swell and rendered him ill. The mill had upon him the effect of a Leyden jar.

Parish of Port de Paix.—According to the meteorological observations made on the Souverbie plantation, which adjoins the town of Port de Paix, from 1775 to 1785, the Réaumur thermometer rose only twice to 28° [35° C.], viz., on June 15, 1775, and October 25, 1776, and did not fall below 14° [17½° C.] above freezing. Those made on the plantation of M. Gauché, at the lower entrance to the canton of Haut Moustique, give for the mean temperature, at 6 a. m., 15° to 20° [19–25° C.]; at midday, 22° to 26° [27½–32½° C.]; except that in March and April the temperature is sometimes 13° [16° C.] in the morning and 19° [24° C.] at midday. Only three times did the temperature rise to 26½° [33° C.].

Thundershowers generally occur between noon and two o'clock. They come with equal frequency from east and west, but rarely from the south. Rains were excessive in May and June, 1689.

[6] The duration of the observations is not stated. Hann (Met. Zeit., 1889, p. 212) follows Moreau de Jonnès in assuming that this was one year's rainfall, but it seems much too great.

On August 15, 1784, the parish experienced a moderate gale, which threw down nearly all the banana plants.

WESTERN PART.

The western part has less rain than the northern part. This is due to three causes. Firstly, the chain of mountains along the eastern frontier opposes a barrier to the passage of the clouds carried by the east wind. Secondly, the configuration of the coast and the topography of the country cause the prevailing easterly winds to curve about, after passing the mountains, and blow in from the west,[1] thus helping to oppose the passage of the clouds over the mountains. Thirdly, the promontory which terminates in Môle St. Nicolas hinders the north winds, which prevail during certain months of the year, from bringing their moisture to this portion of the island.

Rain falls, however, in the western part, and between the end of March and the middle of May it is usually preceded by haze or fog.

The first five months of the year are the most favorable to health, while the months from August to November are the most unhealthful.

Parish of Môle St. Nicolas.—Here the sea breeze is easterly and blows with much force. In recent years, however, westerly winds, which were formerly very rare, have become quite frequent, and are attended by excessive heat.

Parish of Bombarde.—This parish resembles that of the Môle in its liability to drought. After the hurricane of 1772 there was a cruel drought which extended nearly into 1774. A careful observer has found that Bombarde received in the twelve years 1774–1785 28 feet 10 inches $9\frac{3}{4}$ lines of rainfall, or an annual average of about 2 feet 5 inches [785 mm.], which would have sufficed had the rain been favorably distributed with regard to the stages of plant growth.

Parish of Port-à-Piment.—The climate of Port-à-Piment varies with the locality, but is everywhere very healthful. In the plain of this name the skies are nearly always serene, the air is brisk and warm, but the nights are always cool. The winds are regular during nine months of the year. From November to March the north and northeast winds are insupportable on account of the white dust with which they are charged and which is blown up from the soil. One remarkable phenomenon of the plain of Point-à-Pitre is that it never has dew. Deliquescent salts or pieces of paper show no effects of moisture after a night in the open air, and one may sleep out of doors with impunity, even when exposed to moonlight, which many people in the West Indies believe augments the real danger of sleeping in the dew.

The rains in this plain are local, and occur during the season of thunderstorms, i. e., from May to the end of September. The spring and winter are always dry. The rainy period is not, however, to be depended upon; no part of the colony is more afflicted with droughts than Port-à-Piment. According to old colonists, this scourge once lasted three years without interruption, and all the live stock perished. In 1779 and 1780 there were eighteen months during which not a drop of rain fell.

The Réaumur thermometer rises to 32° [40° C.] during July and August, remaining at 25° [31° C.] during the night. In October it stands at 28° [35° C.] at 3 p. m., the time of the maximum, and 22° [$27\frac{1}{2}$° C.] at night. From November through June the nights are cool, and even by day the temperature often falls to 16° [20° C.].

If during the period of the north wind the west wind becomes strong enough to offer much resistance to it, both waterspouts and sandspouts are observed in this region. The former are attended with a dull sound like that which precedes an earthquake. The latter are less lofty than the former, of greater volume, and of shorter duration, and disappear near to their point of origin; no sound accompanies them. They may last for a quarter of an hour.

In the Plaine du Parc the weather is very rainy during the thunderstorm season; but, although it is not so dry at other seasons as Port-à-Piment, it is nevertheless subject to very severe droughts. Terre-Neuve, on the other hand, has frequent rains, as its mountains, except on the side facing the sea, are watered by both the norths and the thunderstorms. The air is pure and the climate cool. Bras-Droit has a similar climate.

Parish of Gonaïves.—The rainfall is very irregular, and the parish suffers from both floods and drought. In 1733 a flood inundated the whole plain. In 1744 there was a considerable drought. In the night of August 4–5, 1772, Gonaïves was visited by a gale which did damage in all the northern part of the colony. In February, 1777, this parish had not had rain for eleven months, and for seven months the river had been dried up. In the plain of Gonaïves are to be seen the evidences of a dry climate, cactus growing abundantly, etc.

Artibonite plain and river.—There are generally two regular seasons, the dry and the rainy. The former commences with the month of November and lasts to the middle of May; the latter comprises the rest of the year. The dry season is generally rainless; if rains occur they presage a late rainy season. The arrival of the rainy season is announced in April or May by thunder and rains in the mountains in the late afternoon; these gradually move from east to west, advancing into the plain.

The plain does not all have a similar rainfall. From the village of Verrettes to that of Petite-Rivière the rains are more abundant and earlier than elsewhere in the plain. From Petite-Rivière for a distance of three and a half leagues down the valley the rains are more frequent and of longer duration than in the lower part of the plain.

It is a curious fact that at Artibonite rain falls only in the afternoon, after 3 o'clock. The sky is clear every morning, but, in the rainy season, becomes overcast between 3 and 5 p. m. Distant thunder is heard; the west wind falls; and an east wind springs up, bringing with it a gentle and beneficent rain, which, however, is sometimes replaced by disastrous downpours. The end of the rainy season is announced by rains without thunder, lasting sometimes for days together.

The regular succession of the dry and the rainy seasons is sometimes interrupted by destructive droughts or freshets.

Parish of Saint Marc.—The climate is generally dry, but varies with the locality. In the section bounded on the east by the road from the Ester River to the lower ferry, on the north by the Ester, on the west by the ocean, and on the south by the Artibonite, this dryness is extreme. The earlier summer thunderstorms, coming from the east, do not reach this locality. Three or four heavy thunderstorms, preceded by very dusty wind-squalls, occur in the period from June to September, and this constitutes the whole rainfall of the year. This region is called "l'Étable."

The corresponding district on the left bank of the Artibonite has a climate similar, but a little less dry. The mountains extending to Point Saint-Marc are extremely dry. It is in the direction of Montrouis, however, that the lack of rain is most

[1] The writer enlarges upon this alleged recurving of the trade wind, explaining that the easterly current, having skirted the mountainous north and south coasts, after reaching the headlands of Môle St. Nicolas and Tiburon, "feels the effect of the sort of rarefaction produced in the intervening space where the mountains of the eastern frontier have impeded its passage," and sweeps into the Gulf of Gonaïves, giving westerly winds to the west coast. Probably the real explanation of the westerly winds on this coast (so far as they exist) is that they are merely the normal diurnal sea breeze, which, thanks to the barrier of mountains to the eastward, is not suppressed by the trades. An inspection of the daily observations at Port au Prince by Scherer, published in the Vienna Jahrbücher, shows that the wind at that station is almost invariably from the eastern quadrant at the morning (7 a. m.) observation, but has shifted to a westerly direction by the time of the midday observation (1 p. m.).

severely felt. When I visited there in April, 1783, only three showers had occurred in twenty months. Generally no rain falls before June, and sometimes none before July.

At Saint Marc a westerly sea breeze prevails by day, alternating with a land breeze from the northeast.

Parish of Mirebalais.—The climate is generally dry. As the parish is surrounded by mountains there is very little wind. Fogs are common. The heat is great, owing to the soil, but cool nights prevail.

Parish of Arcahaye.—As in the case of the other districts lying west of the frontier mountain range, the climate of Arcahaye is generally dry for six months of the year. The rains begin at the end of April or the beginning of May and end toward the middle of October. The sea breeze is west, and the land breeze northeast.

On May 30, 1786, toward 4:30 p. m., hail fell at Boucassin, lasting half an hour. The smallest hailstones were the size of pistol balls, the largest as big as pigeon eggs. On May 1, 1787, at 2:15 p. m., a violent windstorm began in the canton of Fond-Baptiste, accompanied by rain and hailstones as large as those of 1786. The rain and hail lasted 25 minutes, at the end of which time there were two inches of hail on the ground. The temperature at the beginning of this storm was 15° R. [19° C.]. The coffee plants were much damaged by this storm, as also by that of April 16, 1788.

Sugar cane can not be cultivated without irrigation, as the rainfall is not sufficient.

Parish of Croix des Bouquets.—The climate is dry. There is generally no rain from October to about the middle of April, except during the prevalence, for four or five days, of a north or south wind, when a steady, fine rain falls. This rarely happens more than two or three times during the six months. These north and south winds are the only ones that give rain in the morning. Mild and agreeable weather prevails during this period. During a north wind of March 12 and 13, 1788, the temperature fell to 9° R. [11° C.] at Pays-Pourri.

More or less rain falls during the other six months—sometimes every day, and sometimes only every eight or ten days, and generally between 4 and 10 p. m. There have been years—notably 1750 and 1751—when this season was rainless. The rains are accompanied by wind squalls, and fall with a violence known only to the Tropics. All the water courses become torrents, and the Grande River causes destruction to life and property. The floods are of short duration, however, thanks to the inclination of the watershed and the comparatively straight course of the streams in this section.

Toward the middle of June the rains cease for three or four weeks, this period being called "St. John's summer" ("l'Eté de St. Jean"). At the end of this period the rains recommence, occurring nearly every afternoon, and are now accompanied by violent thunder and lightning, which seem to reach their maximum intensity in September and October.

According to observations made on a plantation situated one league northwest of Croix des Bouquets there were, in 1785, 62 rainy days, and a total rainfall of 35 inches, 9¾ lines [969 mm.]; in 1786, 44 rainy days, and a rainfall of 28 inches [758 mm.].

Hail fell on August 12, 1789, the stones ranging from the size of a hazelnut to that of a pigeon's egg. Twelve hailstones, taken up at random, were exposed in a vessel, in the open air, for an hour and a quarter before melting.

During the six months of the dry season the winds are pretty regular. The land breeze, blowing between northeast and southeast, prevails normally from 10 p. m., to 10 a. m., the sea breeze, coming from the west, blows during the remaining hours. This exact division is not common, however; the land breeze sometimes blows until 1 p. m. During the other six months the west wind sometimes fails for three successive weeks. The wind blows violently from the east, withering and drying up everything. The air is filled with a penetrating dust. Sometimes, however, the west wind, instead of dying away in the evening, increases in force and blows strongly until daybreak.

It is generally between the period of St. John's summer and the month of September that terrible storms, amounting to small hurricanes, occur in this region, coming from the east or southeast, and laying low the sugar cane, uprooting trees, and overturning or unroofing the buildings.

One of these storms occurred July 6, 1751. It began about 8:30 p. m. with a northeast wind, which became furious at 9 p. m. The parsonage of Cul-de Sac and the buildings belonging to it were all unroofed, and the large trees of the neighborhood were uprooted. Great damage was done in the cane fields. Fires broke out at several points where cabins were thrown down. The wind diminished at 9:30. On September 20 of the same year a similar hurricane occurred, doing equal damage.

On August 16, 1788, occurred a terrible hurricane, which blew down houses, cabins, and barns, destroyed crops, and buried negroes beneath the ruins of their homes. In the mountains many of these unfortunates died of cold and exposure.

This parish has suffered severely from earthquakes, especially from the terrible earthquake of 1770.

The parish of Croix des Bouquets and the plain of Cul-de-Sac are considered to have a healthful climate. Generally the breeze tempers the heat. When, however, the easterly winds become vehement and (to use a Santo Domingan expression) "*carabinées*," one is obliged to remain indoors to escape their violence; the air becomes dry and renders respiration painful, and all objects become hot to the touch.

Parish of Port au Prince. The division into dry and rainy seasons is in general the same as in the parish of Croix des Bouquets, but is subject to variations. From the beginning of November, 1768, to February 10, 1769, there were but fifteen days without rain. Some of the showers were very heavy and accompanied by thunder, and north and west winds were very frequent.

The temperature varies with the location. That of the town of Port au Prince ranges between 14° and 32° R. [17½° and 40° C.]. In the canton of Nouvelle-Touraine, at the foot of Mount La Selle, the temperature fell on the 12th and 13th of March, 1788, during a north wind, to 5½° R. [7° C.].

From November, 1785, to May 5, 1786, a desolating drought prevailed.

According to the observations of M. Mozard the rainfall at Port au Prince (the town) during 1786 was 32 inches 10¼ lines [889 mm.], and during the first six months of 1787, 19 inches 1⅛ lines [517 mm.].

Large hailstones fell in the town on March 13, 1778, during a thunderstorm.

There are few towns in which lightning so frequently strikes as at Port au Prince. [The writer gives details of several cases.] The use of lightning-rods was begun here in 1787. During a severe thunderstorm on October 6, 1789, the lightning, which struck in two places, is thought to have *ascended* instead of descending.[8]

The hurricane of July 6, 1751, mentioned in connection with the climate of Croix des Bouquets, also raged at Port au Prince, unroofing houses and doing other damage. Destructive storms occurred also May 23, 1771, and August 26–28, 1785. The most memorable storm, however, was that of Saturday, August 16, 1788. Rain fell in the morning—a rare occurrence at Port

[8] The phenomenon of ascending lightning is referred to by many early writers. The Abbé Cotte cites a passage from Pliny to prove that it was observed by the ancients: *Etruria erumpere terrâ quoque fulmina arbitratur.* (Hist. Natur. lib. II, cap. LII.)

au Prince. The wind at the beginning of the storm varied between north-northwest and north; at 6 o'clock it shifted to east-northeast, blowing with extreme violence for three and one-half hours, and varying to east-southeast. During this period one-tenth of the houses were partially or entirely unroofed, and many were blown down, among the latter a cabin 180 feet long, in which were lodged the negroes belonging to the government. Many elm trees were uprooted. The greatest damage was done in the harbor, where many vessels were driven ashore and some were sunk, many lives being lost. On the 18th 60 bodies, of whites and negroes, were counted on the shore. The barometer at noon of the 15th read 28 inches 1 line [760.2 mm.]; at 10 p. m., 27 inches 11½ lines [756.8 mm.]; at 7 a. m. of the 16th, 27 inches 7½ lines [747.8 mm.]. At 10:30 of the 16th it had risen to 27 inches 9 lines [751.2 mm.]. The temperature remained during the storm at 17° R. [21° C.]. On the 16th 23 lines [52 mm.] of rain fell.

The storms experienced in the southern part of the island, which sometimes extend their ravages to the western gulf [Gulf of Gonaïves], are evidently due to the same cause as the hurricanes of the Lesser Antilles, since they occur at the same season and have a similar character, differing only in intensity. This cause, hitherto unexplained, seems to upset all theories by its singular effects, among them being the tortuous direction which the wind sometimes follows.

[The violent east winds, or "brises carabinées," experienced at Port au Prince and Cul-de-Sac, which are strongest during the period from May to October, are explained as due to the concentration of the trade winds in passing through the narrow passes of the frontier chain. The writer describes in detail the topographic features producing this effect.

Interesting particulars are given of the disastrous earthquakes with which this part of the island has been afflicted.]

Parish of Léogane.—The climate varies with the locality, as in other parishes. In the plain the winds are not so regular as at the Cape nor even as at Port au Prince. The mountains often intercept the east wind, which is dry, but cool, and which, when it blows at sunrise, indicates a fine day. The westerly or sea breeze often fails. The northerly winds, when they incline to the east, are cold and rainy; when they shift toward the west, hot and stormy (*orageux*). The southerly winds are hot and dry.

In the coolest weather the temperature is 16° R. [20° C.] in the morning, 20° R. [25° C.] at midday, and 18° R. [22½° C.] in the evening; in the hottest weather, 23° R. [29° C.] in the morning, 28° R. [35° C.] in the afternoon, and 24° R. [30 °C.] in the evening. In the mountains the nights are cold enough to require the use of warm bed coverings, and open fires are enjoyed in the evening.

The annual rainfall of the plain of Léogane, calculated by M. Baussan, from observations for the 20 years 1761–1780, inclusive, is about 50 inches [1354 mm.]. The dryest year was 1769, with 38 inches 10 lines [1051 mm.], and the wettest 1765, with 61 inches 7 lines [1667 mm.]. The rainy season is the same as at Cul-de-Sac, viz, from the middle of April to the middle of October. April and September are generally the rainiest months; December, January, and February the dryest.

The most severe thunderstorms are brought by the west wind. They are also those which occur latest in the day.

A disastrous flood occurred in October, 1716. It was followed by malignant fevers, which claimed many victims among recent arrivals in the island. Another inundation occurred July 24, 1724.

A windstorm during the month of September, 1741, destroyed the cane and indigo. Other more or less destructive storms occurred during the night of September 24–25, 1741; on August 2, 1765 (when 74 lines [167 mm.] of rain fell in 24 hours); on October 15, 1780; and on August 16, 1788.

Tidal waves sometimes occur on the coast.

Lightning frequently strikes in the vicinity of the town and in the harbor of Léogane. This happened ten times in 1765.

An aurora borealis was observed at Léogane July 28, 1780, from 7 to 8 p. m.

Parish of Grand-Goave.—The climate is dry and healthful. Destructive floods, however, occurred October 26–27, 1716, and July 24, 1724. Severe windstorms occurred September 24, 1741, and in September, 1756.

Parish of Cayes de Jacmel.—The climate is dry. In the cantons of Sale-Trou and Cap-Rouge it is necessary to use cisterns to prevent the water supply from failing during the long droughts. The seasons are the same as at Croix des Bouquets. The day breeze is easterly, the night breeze northerly. The former is deprived of its moisture in its passage over the frontier chain, and it is observed that the climate is drier the nearer one approaches this chain. The high Mount La Selle also catches the moisture borne by winds from the direction in which it lies. Like the rest of the southern coast, this parish suffers from southerly gales. They have occurred July 24, 1724; September 21, 1751; September 16, 1754; September 5, 1781; August 26, 1785; August 16, 1788.

Parish of Jacmel.—The climate, which has periods similar to those of Cayes de Jacmel, must be considered a dry one. The day breeze, which is strong, comes from the east-southeast and the night breeze from northwest. Southerly gales are experienced; those mentioned in connection with Cayes de Jacmel were also destructive in Jacmel.

Hail fell during a thunderstorm in July, 1774.

A severe drought, followed by a visitation of caterpillars, occurred in 1764.

Parish of Bainet.—Bainet is subject to severe droughts, and to gales from the south. Of the latter, those of September 21, 1751, and September 5, 1781, are especially mentioned.

SOUTHERN PART.

The climate is less dry than that of the western part. The east wind prevails by day, and it has not the dessicating character of the "brises carabinées" of Cul-de-Sac. The north side feels the influence of the norths, which, however, become dry and scorching by the time they have crossed the mountain ridge to reach the southern side. The latter side suffers from disastrous winds, between east-southeast and west-southwest, occurring between July 15 and October 15; they are much less severely felt on the north side. The southerly winds are always rainy.

Parish of Petit-Goave.—The climate is quite similar to that of Léogane. Meteorological observations were made at Petit-Goave by the celebrated expedition which the French Academy of Sciences sent out to Peru to measure an arc of meridian. In September, 1735, M. Godin, of this expedition, observed a temperature of 23° R. [29° C.] in the morning and 27° R. [34° C.] during the day.

Petit-Goave experienced a furious hurricane August 14, 1680. Other hurricanes occurred in September, 1756, on August 2, 1765, and August 4, 1772, the last following a very severe drought. Many disastrous floods have occurred here.

Parish of Fond-des-Nègres.—The climate varies with the location. Rain fell on 102 days in 1779, 105 in 1780, 114 in 1781, 85 in 1782, 95 in 1783, 115 in the first nine months of 1784, and 97 in the first six months of 1785, indicating on the average half again as much rainy weather as at Léogane. The wind storm of September 9, 1737, did much damage.

Parish of Anse-à-Veau.—The climate is subject to great vicissitudes. Although the average annual rainfall is 80 to 90 inches [2166 to 2436 mm.], droughts sometimes occur, and on the other hand the annual rainfall sometimes amounts to 120 inches [3248 mm.]. This parish receives rain from the norths. These were quite heavy in 1685.

Parish of Acquin.—The climate is very dry. The years 1726, 1781, and 1782 are especially memorable in this respect. In

the last-named year neither sweet potatoes nor maize could be raised. There was a flood September 6, 1754. The sea breeze is generally east-southeast, and the land breeze northeast. Destructive windstorms occur; that of September 9, 1737, did not leave a single house standing, while that of 1783 also caused much damage.

Parish of St. Louis.—The sea breeze here is east-southeast to southeast; the land breeze northeast. The latter is strong, on account of following a chain of mountains and gorges.

September 26 and 27, 1716, there was a flood and a destructive windstorm. On September 9, 1737, at 2 p. m., the wind shifted from north to northwest, later it passed to south, southwest, and finally to the west, from which quarter it was most violent. All the houses were unroofed and many were blown down. Seven of the ten vessels in port went aground; two vessels sank, with a loss of fourteen lives. A violent hurricane occurred in the night of September 24–25, 1741, and another in the night of September 21–22, 1751. A gale occurred in the night of September 16–17, 1754. A north wind, which began March 8, 1788, continued with increasing force for six days, becoming destructive to the crops. In March, 1721, no rain had fallen at St. Louis for eight months.

Parish of Cavaillon.—The sea breeze is from the east, the land breeze from northwest or west-northwest. The gale of September 9, 1737, did much damage. During the winter months fogs occur in the lowlands in the morning, especially in the canton of Mal-Fini.

According to observations made on a plantation in the upper part of the plain of Cavaillon, the mean annual rainfall from 1780 to 1785, inclusive, was 76½ inches [2071 mm.]. The rainfall of 1782 was but 42 inches 10 lines [1160 mm.]; that of 1784 was 120 inches 9 lines [3269 mm.]. A severe flood occurred in 1761. In the hurricane of August 16, 1788, there fell in the gorge of Cavaillon, in 24 hours, 14 inches 5 lines [390 mm.] of rain.

Parish of Cayes.—There are two well-marked seasons, the rainy season from April to October and the dry season from October to April. The former begins with distant thunderstorms, which draw nearer and grow more frequent with the advancing season. The abundant rains come on toward the middle of May, and continue during July and August. The periods of great heat occur in August and September; then thunderstorms, sometimes very rainy, reappear, but gradually become distant, and the dry season sets in. The thunderstorms almost always come from the east, and generally break over the town, so that often points seven or eight hundred toises [about a mile] outside its borders receive no rain. The rains come from the same quarter, but in July and August all the winds are rainy. The mean annual rainfall is 70 to 75 inches [1895–2030 mm.].

The air is refreshed by the alternate land and sea breezes. The former are east-southeast and southeast; the latter north or northwest. From September to March the north winds are quite cold.

Hurricanes raged here in 1680; September 21–22, 1751; September 17–22, 1754; September, 1756; August 4–5, 1772; August 27–28, 1775; August 16–17, 1788. [That of 1754 appears to have been the most destructive on sea and shore, and was a typical West Indian hurricane. It began with a heavy swell on the morning of September 17. The shift of the wind was from north through northeast to east-southeast. Many vessels were stranded and six persons were drowned.]

Parish of Torbec.—The climate is very similar to that of Cayes. In the canton of Platons the temperature does not rise above 23° R. [29° C.].

Parish of Port-Salut.—The climate is dry. The water supply depends upon wells, and even these are likely to dry up, unless located near the sea or the small water courses.

Parish of Côteaux.—The climate is dry and becomes more so each year. In 1785 all the crops were destroyed by drought. On the other hand, a destructive freshet occurred in September, 1772. The sea breeze is east-southeast to east; the land breeze northeast. The dry season is generally from December to July.

Parish of Tiburon.—The climate is mild. The temperature does not rise above 22° R. [27½° C.], and falls to 17° R. [21° C.]. The annual rainfall is about 100 inches [2707 mm.]. The land breeze is strong and regular; it blows from north or northwest, and lasts until 8 a. m. The sea breeze is east to southeast.

Parish of Dalmarie.—From Irois to Dalmarie the day breeze is northwest and the night breeze southeast. The true norths bring rain, but the northeast winds are dry.

Parish of Jérémie.—The climate is generally healthful. The temperature hardly ever exceeds 24° R. [30° C.], even in exposed places near the sea. Caïmites has a climate intermediate between that of the coast and that of the high mountains. Plymouth is cold compared with the rest of the parish; its elevation, its proximity to high mountains, its northern exposure and the frequency of rain all conspire to diminish the temperature, which, however, may rise to 23° R. [29° C.] in July and August; in December it descends to 10° R. [12½° C.], which is extreme for Santo Domingo. In general, during the fine days of the winter months one might think one's self in France in the month of May.

The prevailing winds at Jérémie are north-northeast by day, and southeast to south at night. The norths are felt here, not only in their proper season, which is from October to April, but also in other months. They sometimes come very suddenly and are always dangerous to vessels. Their force redoubles about 3 or 4 p. m., and remains the same until 9 or 10 p. m., after which it diminishes.

In the thunderstorm season occur what are called *hourvari* or *hourlevari*. These are violent winds which spring up suddenly, sometimes succeeding a dead calm. The wind uproots trees, unroofs houses, and would cause general destruction if its duration were not limited to from a quarter to half an hour. This wind is the beginning of a thunderstorm.

Destructive hurricanes occurred September 4–5, 1772, August 27, 1775, and September 5, 1781.

Jérémie has plentiful rains, some of which it owes to the norths. The mean annual fall is about 90 inches [2436 mm.]. During the hurricanes the fall is sometimes so great as to cause the rivers to rise 20 to 25 feet. The rainfall at Plymouth during the first six months of 1783 was 70 inches 7½ lines [1912 mm.]; during 1784 it was 166 inches 1½ lines [4497 mm.].

From Carcasses, in the parish of Tiburon, to Jérémie there is rarely any rain late in the day, except after a *hourvari*.

Thunder is neither frequent nor of long duration in this parish. Mount La Hotte seems to draw the clouds to itself, and the electrical storms seem to be concentrated upon this elevated spot.

To complete the survey of Haitian meteorology in the eighteenth century a résumé is given below of additional material found in Cotte's "Mémoires sur la météorologie" (Paris, 1788), and in a work entitled "Voyage d'un Suisse dans différentes colonies d'Amérique pendant la dernière guerre" published anonymously by Justin Girod-Chantrans (Neuchatel, 1785). These two works, with that of Moreau de St. Méry, are believed to exhaust the sources of information now extant regarding systematic meteorological observations in Haiti in the eighteenth century, unless the missing second volume of the memoirs of the Cercle des Philadelphes should come to light. The latter work is not to be found in the library of the Collège St. Martial, at Port au Prince—the largest collection in

Haiti of works relating to the former colony—nor in the library of the American Philosophical Society, at Philadelphia, though both of these libraries contain the first volume.

Cotte's "Mémoires", Tome II, includes results from the following stations:

Station.	Latitude.	Observer.
	° ′	
Camp-de-Louise	19 42	Thomas.
Le Cap	19 45	Chabaud.
Léogane	19 52	
Tivoli	18 35	Lefebure des Hayes.

The results for Léogane are copied from Les Affiches Américaines (a colonial newspaper) of October 9, 1784. The name of the observer is not given.

The following are brief abstracts of the text and tables in Cotte's work:

Camp-de-Louise.—The plantation of M. de Ladebat, on which the observations were made, is on the north coast of the island, some leagues from Cap Français. There are mountains to the west and south [of Cap Français. The location of the station with respect to the town is not stated]. For the period June, 1775–September, 1776, the highest temperature was 26.2° R. [32.8° C.]; lowest, 16.5° R. [20.6° C.]; mean daily (from terdaily observations), 20.1° R. [25.1° C.]; highest barometer, 28 inches, $4\frac{4}{12}$ lines [767.7 mm.]; lowest, 28 inches, 0 line [758.0 mm.]; mean (from terdaily observations), 28 inches, $2\frac{1}{12}$ lines [762.7 mm.]; number of days with rain, 110; number of days with thunder, 27.

Cap [9] [i. e., Cap Français, now Cap Haïtien]. Rainfall:

1783.			1784.		
Months.	Inches, lines.	Millimeters	Months.	Inches, lines.	Millimeters.
April	15 5	[417]	January	35 10	[970]
May	24 11	[647]	February	28 6	[772]
June	3 4	[90]	March	12 0	[325]
July	16 0	[433]	April	0 3	[7]
September	12 4	[334]	May	46 7	[1261]
November	51 4	[1390]			
December	15 0	[406]			

Léogane.—Twenty years' observations (1761–1780) on a plantation near the town. Mean annual rainfall, 49.85 inches [1349 mm.]. Mean number of days with rain in the year, 99. Rain fell more often at night than by day. Heaviest rainfall accompanying a thunderstorm (duration not stated), 5 inches 6 lines [149 mm.]. During the hottest weather the temperature was 23° R. [29° C.] in the morning, 27°, rarely 28° R. [34°–35° C.] in the afternoon, and 24° R. [30° C.] in the evening. During the coldest weather the temperature was 16° R. [20° C.] in the morning, 20° R. [25° C.] in the afternoon, and 18° R. [$22\frac{1}{2}$° C.] in the evening. Hence he deduces a mean annual temperature of about 21° R. [26° C.].

Tivoli.—This was the name of the private estate of the Chevalier des Hayes, situated in the parish of Jérémie and the canton of Plymouth, in a valley 221 toises [431 meters] above sea level. Regular observations were made during the years 1772–1782, inclusive, but a part of the results failed to reach the Abbé Cotte, who, in his computations, used only the years 1772 and 1774, the first five months of 1775, the last seven months of 1778, and the years 1779, 1781, and 1782.[10] From the tables published by Cotte it appears that the mean annual rainfall at Tivoli during the years 1781 and 1782 was about 101 inches [2734 mm.], and the average number of days with rain 138. The mean annual pressure was 26 inches $7\frac{5}{12}$ lines [720.6 mm.]. Cotte rejects the observer's record of temperature, on account of the faulty exposure of his thermometers.

[Cf. Moreau de St. Méry's figures for the rainfall of this canton in 1783 and 1784, under "Parish of Jérémie," above].

The "Voyage d'un Suisse" (see above) contains the abstract of a meteorological journal kept "aux environs du Cap" from May 24, 1782, to the end of April 1783—covering therefore about a year. Observations were made regularly four times a day; viz., at 7 a. m., noon, 3 p. m., and 7 p. m.; the means and extremes of pressure and the means and maxima of temperature being deduced therefrom. The minima of temperature were obtained from an extra observation of the thermometer made immediately before sunrise. The pressure is reduced to sea level.

In the accompanying Table 1 the original figures for the pressure have been converted from French inches and lines to millimeters, and those for the temperature from the Réaumur to the centigrade scale. The last column gives the corrected or true daily means of the temperature, obtained from the means of the observations by the use of corrections derived from Hann's values for the diurnal variation at Port au Prince.[11] The mean of readings at 7 a. m., noon, 3 p. m. and 7 p. m., is 1.5° higher, on an average, than the true daily mean. The greatest departure is +1.8° in July; the least +1.3 in December.

TABLE 1.—*Meteorological observations made in the vicinity of Cap Français, island of Santo Domingo.*

	Pressure.			Temperature.			
	Highest.	Lowest.	Mean.	Highest.	Lowest.	Mean.	Corrected mean.
1782.	*mm.*	*mm.*	*mm.*	° *C.*	° *C.*	° *C.*	° *C.*
May 24–31	763.0	760.2	761.7	31.9	23.8	29.5	27.9
June	765.3	760.2	763.6	32.5	23.1	28.9	27.8
July	764.2	759.6	762.1	33.4	23.8	29.5	27.7
August	762.8	759.5	761.3	33.1	23.8	30.0	28.8
September	763.0	758.3	760.6	33.4	22.5	28.6	27.0
October	764.7	756.3	760.2	30.9	22.5	27.8	26.4
November	764.7	758.5	761.7	30.6	19.2	25.9	24.5
December	764.2	759.8	762.5	28.4	18.8	25.0	23.7
1783.							
January	766.6	761.0	763.4	28.4	19.1	25.9	24.5
February	767.5	762.1	765.5	28.8	20.0	25.9	24.3
March	767.7	762.5	764.5	29.1	20.0	25.5	23.9
April	767.5	760.8	763.8	30.0	19.7	25.9	24.2
Year	767.7	756.3	762.6	33.4	18.8	27.4	25.9

MEAN ANNUAL RAIN MAP OF NEW SOUTH WALES.

We have lately received a very neat map showing by isohyetal lines the mean annual rainfall of New South Wales. This map was compiled at the meteorological office of the Sydney Observatory; it is published without accompanying text, and will doubtless be called for and used by thousands. It is limited to the territory of New South Wales, and shows that in general from 8 to 10 inches of rainfall may be expected on the western border of that state, increasing thence eastward, at first slowly and afterwards rapidly, up to 70 inches in the northeast corner and to 34 inches in the southeast corner, with numerous local irregularities as we pass along the eastern coast. The maximum annual rainfalls seem to be 64.20 at Alanora, 59.13 at Lawson, 61.19 at Camden Haven, 59.41 at St. Georges Head, 65.71 at Woolkoolga, and 77.70 at Callbyron. According to a footnote on this map, these and similar station means are computed from all yearly records available, generally covering a period of from 20 to 40 years. It is, however, very important that a rainfall map should uniformly represent some fundamental interval of time, so that all the data may be strictly comparable throughout the whole map. The reduction of a short series or a long series to such a fundamental interval is done as shown on page 216 of the MONTHLY WEATHER REVIEW for April, 1902.

[9] These observations at Cap Français are rejected as "entièrement fausses" by Alexandre Moreau de Jonnès in his "Histoire physique des Antilles Françaises" (Paris, 1822), p. 300.

[10] Some of the same data, together with portions of the record not used in Cotte's "Mémoires," were published in the Histoire de la Société royale de Médicine. (Paris, 1779, etc.)

[11] Hann, J. Der tägliche Gang der Temperatur in der inneren Tropenzone. Wien. 1905, p. 33.